

Growth Factors and Their Clinical Applications

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– Abstract –

Growth factor is a polypeptide regulating cell proliferation, maturation, activity, and apoptosis. Despite its small molecular weight, it exerts diverse and potent biologic effects on cellular function. With recent development of molecular biology and vector technology, it is now possible to administer recombinant growth factors in clinical dose and modify somatic cell with growth factor encoding gene. Research fields in spinal surgery can be divided into spinal fusion, disc regeneration and spinal cord regeneration. In this review, we discuss the action mechanism of growth factors and their possible clinical applications especially in the field of spinal fusion and disc regeneration.

Key Words : Growth factor, Spinal fusion, Disc degeneration

Table 1. Abbreviation used in the text

TGF-β1	Transforming growth factor-beta1
EGF	Epidermal growth factor
IGF-1	Insuline like growth factor-1
BMP-2	Bone morphogenic protein-2
PDGF	Platelet derived growth factor
OP-1	Osteogenic protein-1
aFGF	acidic Fibroblast growth factor
bFGF	basic Fibroblast growth factor

가
가
가
16,24,25,33)
가
,
,
,
(spinal fusion),
(regeneration of intervertebral disc
matraix),
(spinal cord regeneration)

Table 1

가

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가

epidermal growth factor(EGF)

가

(receptor)

가 가

(signaling molecule)

, , , , ,

(mineralocorticoid, glucocorticoid, estrogen, testosterone, progesterone)

D, retinoic acid

signal transduction pathway)

(intracellular

가

가

TGF-

1, BMP-2, OP-1(BMP-7) TGF

Smad

, nitric oxide carbon

monoxide

가

IGF-1 P13K

NF- B

(neurotransmitter)

가

(growth factor)

BMP

가

가

, IGF-1, IGF-II, TGF- 1, BMP

PDGF, aFGF, bFGF

neuropeptide

endorphins

enkephlins,

BMP

prostaglandin, prostacyclin,

thromboxane, leukotriene

가

BMP

BMP-2

Monroe 21)

BMP-2

가

BMP-2

가

Rita Levi-Montal-

nerve growth factor(NGF) 가 1950

13), NGF

가 BMP-2 가 LIM mineralization protein-1³³⁾
 1,23,29) BMP
 가 BMP
 가 BMP-2²²⁾ 가가
 BMP-2 가가
 ,
²⁸⁾ Riew ²⁷⁾
 (mesenchy-
 mal stem cell) BMP-2
 TGF- 1
 BMP-7(OP-1) Thompson ³²⁾
 (TGF- 1, IGF-1, FGF, EGF)
 TGF- 1 가
 가
 (carrier) OP-1 100% 가
 65%, 0% Gruber ⁴⁾ 3
 TGF- 1
 가
²⁾ 가
 OP-1 가
 가 OP-1 Nishida ²⁵⁾ TGF- 1
 TGF- 1
 가
 TGF- 1
¹⁵⁾ 4 TGF- 1
 OP-1 가 3 Moon ¹⁷⁾
 TGF- 1
 OP-1 가
¹¹⁾ OP-1
 Laursen ¹²⁾ 3-6
 가
 OP-1
 Moon ¹⁹⁾
 BMP-9 3 TGF- 1
 TGF- 1
 가
 BMP-9 (TGF- 1)
 BMP-9⁸⁾ ²⁰⁾
 LIM mineralization protein-1 BMP-2
 BMP-2
 BMP-2 가
 BMP-2

. Grimsrud ³⁾ BMP-2

Hanada ⁶⁾ BMP-2 TGF- 1

. Smith

³⁰⁾ BMP-2 가

IGF-1

. Moon ¹⁹⁾

BMP-2

Moon ¹⁸⁾ 가

(Tran- 가

BMP-2 description) . BMP-2 가

Muschick ²²⁾ 가

()

가

가

Moon ¹⁹⁾ BMP-2 TGF- 1

BMP-2 TGF-

1 Smad

가

가

IGF-1

Osada ²⁶⁾ 가

Moon ¹⁹⁾ IGF-1

. IGF-1

TGF- 1 BMP-2, OP-1 TGF

TGF

. Gruber ⁵⁾ IGF-1

PDGF (apoptosis)

. IGF-1

IGF-1 가

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EGF, FGF

Thompson ³²⁾ EGF FGF

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